

Notice No. 13 (Corrigenda)

Rules and Regulations for the Classification of Ships, July 2014

The status of this Rule set is amended as shown and is now to be read in conjunction with this and prior Notices. Any corrigenda included in the Notice are effective immediately.

Issue date: May 2015

Amendments to	Effective date
Part 1, Chapter 2, Sections 1, 2, 3 & 4	1 July 2015 & Corrigenda
Part 1, Chapter 3, Sections 1, 2, 4, 10, 18 & 23	1 July 2015 & Corrigenda
Part 3, Chapter 4, Section 8	Corrigendum
Part 3, Chapter 5, Sections 4 & 5	Corrigenda
Part 3, Chapter 6, Sections 4 & 5	Corrigenda
Part 3, Chapter 8, Section 1	1 July 2015
Part 3, Chapter 9, Section 8	Corrigenda
Part 3, Chapter 10, Section 3	Corrigendum
Part 3, Chapter 11, Sections 1 & 2	1 July 2015 & Corrigendum
Part 3, Chapter 12, Section 3	Corrigendum
Part 3, Chapter 13, Section 1	1 July 2015
Part 3, Chapter 14, Sections 1, 3, 8 & 9	Corrigenda
Part 4, Chapter 1, Sections 5, 6, 7 & 8	Corrigenda
Part 4, Chapter 2, Section 2	Corrigendum
Part 4, Chapter 4, Section 8	Corrigenda
Part 4, Chapter 5, Section 6	Corrigendum
Part 4, Chapter 7, Sections 1, 2, 8 & 9	1 July 2015 & Corrigenda
Part 4, Chapter 9, Sections 1 & 9	1 July 2015 & Corrigendum
Part 4, Chapter 10, Section 1	Corrigendum
Part 4, Chapter 11, Sections 6 & 8	Corrigenda
Part 5, Chapter 1, Section 6	Corrigendum
Part 5, Chapter 2, Sections 7, 9, 11 & 13	Corrigenda
Part 5, Chapter 3, Section 6	Corrigenda
Part 5, Chapter 4, Section 8	Corrigenda
Part 5, Chapter 5, Sections 3 & 6	Corrigenda
Part 5, Chapter 8, Section 2	Corrigendum

Notice No. 13 Continued

Issue date: May 2015

Amendments to	Effective date
Part 5, Chapter 8, Section 2	Corrigendum
Part 5, Chapter 9, Section 8	Corrigendum
Part 5, Chapter 10 Sections 1 & 18	Corrigenda
Part 5, Chapter 12 Section 6	Corrigendum
Part 5, Chapter 13, Section 11	Corrigendum
Part 5, Chapter 14, Section 12	Corrigenda
Part 5, Chapter 15, Section 7	Corrigenda
Part 5, Chapter 24, Sections 3, 6 & 9	Corrigenda
Part 6, Chapter 1, Sections 1 & 2	Corrigenda
Part 6, Chapter 2, Section 1	Corrigendum
Part 7, Chapter 4, Sections 2, 4 & 5	Corrigenda
Part 7, Chapter 13, Sections 3, 4, 5 & 6	Corrigenda
Part 8, Chapter 2, Sections 1 & 10	1 July 2015 & Corrigenda

Part 1, Chapter 2

Classification Regulations

Corrigenda

■ Section 1

Conditions for classification

1.1 General

1.1.5 Any damage, defect, breakdown, grounding, serious deficiency, detention or, arrest or refusal of access, which could invalidate the conditions for which a class has been assigned, is to be reported to LR without delay.

■ Section 2

Character of classification and class notations

2.1 Definitions

(Part only shown)

Table 2.2.2 Special features notations

Special features notation	Description	See also
Bottom Strengthened for (Operating Aground) (Loading and Unloading Aground)	Assigned where the bottom structure has been additionally strengthened for loading and unloading aground	Pt 3, Ch 9,8 9.7 and Pt 4, Ch 12, 1.3.4
Hold No(s) ... Strengthened for Regular Discharge by Heavy Grabs	Assigned to bulk carriers where cargoes are regularly discharged by heavy grabs and the thickness of the plating of the hold inner bottom, hopper and transverse bulkhead bottom stool is increased	Pt 3, Ch 9,8 9.7

Effective Date 1 July 2015

2.3 Class notations (hull)

2.3.13 **CSR.** This notation will be assigned to bulk carriers and double hull oil tankers compliant with the *IACS Common Structural Rules for Bulk Carriers and Oil Tankers (CSR)*, see Pt 4, Ch 7,1.2.1 and Ch 9,1.2.1. Additional mandatory and non-mandatory class notations for CSR bulk carriers are given in 2.3.14.

2.3.14 **Class notations for CSR bulk carriers.** In general, CSR bulk carriers less than 150 m in length are to comply with the requirements of Pt 4, Ch 7, 1.4 and the ~~IACS Common Structural Rules for Bulk Carriers (CSR)~~ *IACS Common Structural Rules (CSR)* and will be eligible for one of the following mandatory class notations:

{anyholds may be empty}

This class notation is normally assigned to a ship designed to carry dry bulk cargoes of cargo density 1,0 tonne/m³ and above, with an approved arrangement of loaded holds such that any hold may be empty at the maximum draught.

{holds a, b, ... may be empty}

This class notation is normally assigned to a ship designed to carry dry bulk cargoes of cargo density 1,0 tonne/m³ and above with specified holds empty at maximum draught.

In general, CSR bulk carriers equal to or greater than 150 m in length are to comply with the requirements of Pt 4, Ch 7, 1.5 and the ~~IACS Common Structural Rules for Bulk Carriers (CSR)~~ *IACS Common Structural Rules (CSR)* and will be eligible for one of the following mandatory class notations:

BC-A, {holds a, b, ... may be empty}

This class will be assigned for bulk carriers designed to carry dry bulk cargoes of cargo density 1,0 tonne/m³ and above with specified holds empty at maximum draught.

BC-B

This class will be assigned for bulk carriers designed to carry dry bulk cargoes of cargo density 1,0 tonne/m³ and above with all cargo holds loaded.

BC-C

This class will be assigned for bulk carriers designed to carry dry bulk cargoes of cargo density less than 1,0 tonne/m³ with all cargo holds loaded.

The following additional notations and annotations are to be provided giving further detailed description of limitations to be observed during operation as a consequence of the design loading condition applied during the design:

(maximum cargo density (in tonnes/m³))

For notations **BC-A** and **BC-B** if the maximum cargo density is less than 3,0 tonnes/m³

Part 1, Chapter 2

(no MP)

For all notations when the vessel has not been designed for loading and unloading in multiple ports in accordance with the conditions specified in ~~IACS Common Structural Rules for Bulk Carriers (CSR) Ch 4,7.3.3~~ IACS Common Structural Rules (CSR), Pt 1, Ch 4, Sec 8,4.2.2;

GRAB [X]

Where the net thickness of plating of inner bottom, hopper tank sloping plate, transverse lower stool, transverse bulkhead plating and inner hull up to a height of 3,0 m above the lowest point of the inner bottom, excluding bilge wells comply with ~~IACS Common Structural Rules for Bulk Carriers (CSR) Ch 12,1 for BC-A and BC-B, see CSR Ch 1,4~~ IACS Common Structural Rules (CSR), Pt 2, Ch 1, 6 for BC-A and BC-B, see IACS Common Structural Rules (CSR), Pt 1, Ch 1, Sec 1,3.2.1;

(allowed combination of specified empty holds)

Annotation for notation BC-A.

Corrigenda

2.5 Class notations (machinery special features)

(Part only shown)

2.5.5 The following class notation is associated with gas-fuelled vessels and may be assigned as considered appropriate by the Classification Committee:

GF Assigned to ships other than LNG carriers, where the main propelling and/or auxiliary machinery is designed to operate on natural gas as fuel, or a combination of natural gas and ~~oil-fuel~~ fuel oil. The notation also indicates that the gas-fuelled machinery has been installed and tested in accordance with LR's Rules and Regulations.

■ Section 3 Surveys – General

3.5 Existing ships – Periodical Surveys

3.5.1 Annual Surveys are to be held on all ships within three months, before or after each anniversary of the completion, commissioning or Special Survey in accordance with the requirements given in Chapter 3. The date of the last Annual Survey will be recorded on the ~~ClassDirect Live~~ Class Direct website.

All instances of ClassDirect Live have been amended to Class Direct throughout this Rules set.

All instances of Class Direct Live have been amended to Class Direct throughout this Rules set.

All instances of CDLive have been amended to Class Direct throughout this Rules set.

All instances of CD Live have been amended to Class Direct throughout this Rules set.

3.8 Notice of surveys

3.8.2 LR will ~~arrange timely notice~~ make available to an Owner ~~timely notice~~ about forthcoming surveys by means of ~~a letter or a computer printout of a ship's Scheduled Surveys, Condition(s) of Class and Memoranda~~ Quarterly Listing of Surveys, Conditions of Class and Memoranda. The omission of such notice, however, does not absolve the Owner from his responsibility to comply with LR's survey requirements for maintenance of class, all of which are available to Owners on the ~~ClassDirect Live~~ Class Direct website.

Part 1, Chapter 3

Periodical Survey Regulations

Effective Date 1 July 2015

■ Section 1 General

1.1 Frequency of surveys

1.1.6 In general, the periodical survey requirements contained in Chapter 3 also apply to ships built in accordance with the ~~IACS Common Structural Rules (CSR)~~ IACS Common Structural Rules for Bulk Carriers and Oil Tankers (CSR). Where a requirement does not apply to CSR ships, or where a specific requirement applies only to CSR ships, this will be clearly stated.

1.5 Definitions

1.5.16 **Substantial Corrosion** is wastage of individual plates and stiffeners in excess of 75 per cent of allowable margins, but within acceptable limits. For ships built in accordance with the IACS Common Structural Rules (CSR), substantial corrosion is an extent of corrosion such that the assessment of the corrosion pattern indicates a gauged (or measured) thickness between $t_{ren} + 0,5$ mm and t_{ren} . Renewal thickness, t_{ren} , is the minimum allowable thickness, in mm, below which renewal of the structural members is to be carried out.

Corrigenda

■ Section 2 Annual Surveys – Hull and machinery requirements

2.2 Annual Surveys

2.2.11 Piping systems containing ~~oil-fuel~~ fuel oil, lubricating oil or other flammable liquids are to be generally examined and operated as far as practicable, with particular attention being paid to tightness, fire precaution arrangements, flexible hoses and sounding arrangements.

All instances of oil fuel have been amended to fuel oil throughout this Rules set.

■ Section 4 Docking Surveys and In-water Surveys – Hull and machinery requirements

4.3 In-water Surveys

4.3.4 When there is no access, special consideration shall be given to ascertaining rudder bearing clearances and sternbush clearances based on a review of the operating history, on board testing and stern bearing oil analysis. These considerations are to be included in the proposals ~~for~~ Inwater Surveys which are to be submitted in advance of the survey being required, so that satisfactory arrangements can be agreed with LR.

■ Section 10 Dredgers, hopper dredgers, sand carriers, hopper barges and reclamation craft

10.2 Special Surveys

(Part only shown)

10.2.2 On ships 15 years old and over (Special Survey III and subsequent Special Surveys):

- (b) Hopper doors, valves and items provided to facilitate separation of split hulls are to be checked for proper operation, and their hinges, ~~control gear~~ controlgear and other fittings are to be examined for wear or distortion. All seals and wear-down strips are to be replaced if necessary, but a watertight seal is not normally required. Attention is to be paid to areas likely to be suffering from excessive erosion.

Part 1, Chapter 3

■ Section 18 Inert gas systems

18.2 Scope of surveys

18.2.1 At each Special Survey of the inert gas system, the inert gas generator, scrubber and blower are to be opened out as considered necessary and examined. Gas distribution lines and shut-off valves, including soot blower interlocking devices are to be examined as considered necessary. The deck seal and non-return valve are to be examined. Cooling water systems including the effluent piping and overboard discharge from the scrubbers are to be examined. All automatic ~~shut-down~~ shutdown devices and alarms are to be tested. The complete installation is to be tested under working conditions on completion of survey.

■ Section 23 Natural gas fuel installations

23.7 Intermediate Surveys

(Part only shown)

23.7.1 In addition to the requirements below, The the requirements of 23.1 to 23.6 are to be complied with.

Part 3, Chapter 1

General

Corrigendum

■ Section 9 Procedures for testing tanks and tight boundaries

9.6 Definitions and details of tests

9.6.6 **Vacuum box test** is a test used to verify the tightness of joints by means of a localised air pressure differential and indicator solution. The test is to be conducted with the use of a box with air connections, gauges and an inspection window that is to be placed over the joint being tested with a leak indicator solution applied. ~~Air within the box is to be removed by an ejector to create a reduction in pressure. The pressure inside the box during the test is to be maintained between 0,20 to 0,26 bar. The air~~ within the box is to be removed by an ejector to create a vacuum i.e. a pressure differential of 0,20 to 0,26 bar inside the box.

Part 3, Chapter 4

Longitudinal Strength

Corrigendum

■ Section 8 Loading guidance information

8.2 Loading Manual

(Part only shown)

8.2.4 The Manual is also to contain the following:

- (e) The maximum unladen weight, in tonnes, of grab that is considered suitable for the approved thickness of the hold inner bottom for bulk carriers and ore or oil carriers that are regularly discharged by grabs. This maximum unladen weight may differ for adjacent holds, see Ch ~~9,9.2~~ 9,8.2 and Pt 4, Ch 7,8.1. This weight does not preclude the use of heavier grabs, but is intended as an indication to the Builders, Owners and operators of the increased risk of local damage and the possibility of accelerated diminution of the plating thickness if grabs heavier than this are used regularly to discharge cargo.

Part 3, Chapter 5

Fore End Structure

Corrigenda

■ *Section 4* **Shell envelope framing**

4.1 General

4.1.5 For ships intended to load or unload while aground, see Ch 9,8 9,7.

■ *Section 5* **Single and double bottom structure**

5.1 General

5.1.4 For ships intended to load or unload while aground, see Ch 9,8 9,7.

Part 3, Chapter 6

Aft End Structure

Corrigenda

■ *Section 4* **Shell envelope framing**

4.1 General

4.1.5 For ships intended to load or unload while aground, see Ch 9,8 9,7.

■ *Section 5* **Single and double bottom structure**

5.1 General

5.1.3 For ships intended to load or unload while aground, see Ch 9,8 9,7.

Part 3, Chapter 8

Superstructures, Deckhouses and Bulwarks

Effective Date 1 July 2015

■ *Section 1* **General**

1.1 Application

1.1.5 The requirements in this Chapter are not applicable to Double Hull Oil Tankers or Bulk Carriers with a **CSR** notation with the exception of Section 5 which is to be complied with. See Pt 1, Ch 2,2.3.

Part 3, Chapter 9

Special Features

Corrigenda

■ Section 8 Strengthening for regular discharge by heavy grabs

8.1 Application

8.1.3 The grab weight given in 9.2.4 8.2.1 does not preclude the use of heavier grabs. It is intended as an indication to the Builders, Owners and operators of the increased risk of local damage and the possibility of accelerated diminution of the plating thickness if grabs heavier than this are used regularly to discharge cargo.

8.4 Transverse bulkhead plating

8.4.1 The thickness of the bulkhead or stool plating adjacent to the inner bottom is to be as required by 9.2.4 8.2.1 but based on the actual spacing of the bulkhead or stool stiffeners. The plating of increased thickness is to extend for a minimum distance corresponding to a vertical height of 1,5 m above the line of the inner bottom.

Part 3, Chapter 10

Welding and Structural Details

Corrigenda

■ Section 3 Secondary member end connections

3.4 Scantlings of end brackets

(Part only shown)

Table 10.3.1 Thickness of brackets

Limits		
Minimum	Maximum	
6,5	6,5	12,5
7,5	7,5	13,5

Part 3, Chapter 11

Closing Arrangements for Shell, Deck and Bulkheads

Effective Date 1 July 2015

■ Section 1 General

1.1 Application

1.1.1 This Chapter applies to all ship types detailed in Part 4, unless otherwise stated, with the exception of Sections 1 to 5 which are not applicable to Bulk Carriers with a **CSR** notation and Section 6.1 which is not applicable to Bulk Carriers and Oil Tankers with a **CSR** notation, see Pt 1, Ch 2.2.3. Additional provisions regarding access arrangements for oil tankers and chemical carriers are contained in Pt 4, Ch 9, Ch 10 and the *Rules and Regulations for the Construction and Classification of Ships for the Carriage of Liquid Chemicals in Bulk* (hereinafter referred to as the Rules for Ships for Liquid Chemicals), respectively.

Part 3, Chapter 11

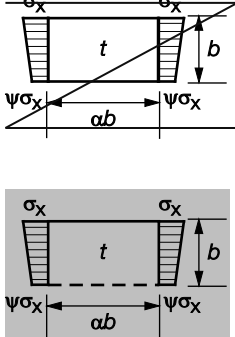
Corrigendum

■ Section 2 Steel hatch covers

2.11 Buckling strength of hatch cover structures

(Part only shown)

Table 11.2.6 Buckling and reduction factors for plane elementary plate panels

Buckling load case	Edge stress ratio ψ	Asp. ratio $\alpha = \frac{a}{b}$	Buckling factor K	Reduction factor κ
<p>3</p> 	$1 \geq \psi \geq 0$ $0 > \psi > -1$	$\alpha > 0$	$K = \frac{4 \left(0,425 + \frac{1}{\alpha^2} \right)}{3\psi + 1}$ $K = 4 \left(0,425 + \frac{1}{\alpha^2} \right) (1 + \psi) - 5\psi (1 - 3,42\psi)$	$\kappa_x = 1$ for $\lambda \leq 0,7$ $\kappa_x = \frac{1}{\lambda^2 + 0,51}$ for $\lambda > 0,7$

Part 3, Chapter 12

Ventilators, Air Pipes and Discharges

Corrigendum

■ Section 3 Air and sounding pipes

3.1 General

3.1.1 Air pipes located on the exposed deck over the forward 0,25L of the rule length, of ships of sea-going service of length 80 m or more, where the height of the exposed deck in way of the item is less than 0,1L or 22 m above the summer load waterline, whichever is the lesser, are to comply with the requirements of Section 5. All other air and sounding pipes are to comply with the following requirements in addition to the applicable requirements of Pt 5, Ch 13,12 and ~~Ch 13,15,2~~ Ch 15,2.

Part 3, Chapter 13

Ship Control Systems

Effective Date 1 July 2015

■ Section 1 General

1.1 Application

1.1.2 The requirements in this Chapter are not applicable to Double Hull Oil Tankers or Bulk Carriers with a **CSR** notation (see Pt 1, Ch 2.2.3) with the exception of the following:

- For Double Hull Oil Tankers; Sections 2 to 6 and Section 9 are to be complied with as applicable.
- For Bulk Carriers; Sections 3 to 6, 9 and Section 10 are to be complied with as applicable.

■ Section 8 Winslass design and testing

8.12 Structural requirements associated with towing and mooring

8.12.6 The selection of shipboard fittings is to be made by the shipyard in accordance with an acceptable National or International standard (e.g. ISO3913 Shipbuilding Welded Steel Bollards ISO13795 Ships and marine technology – Ship's mooring and towing fittings – Welded steel bollards for sea-going vessels). If the shipboard fitting is not selected from an acceptable National or International Standard then the design load used to assess its strength and its attachment to the ship is to be in accordance with the design load given in Table 13.8.5 and the design is to be submitted for approval.

Part 3, Chapter 14

Cargo Securing Arrangements

Corrigenda

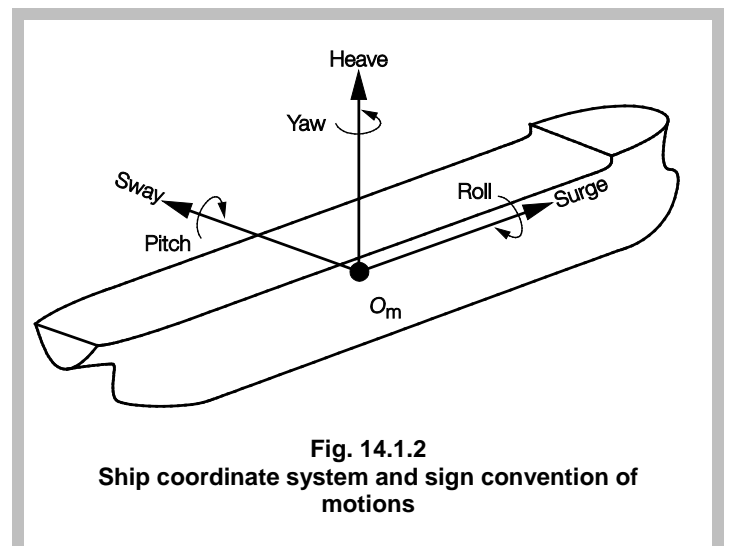
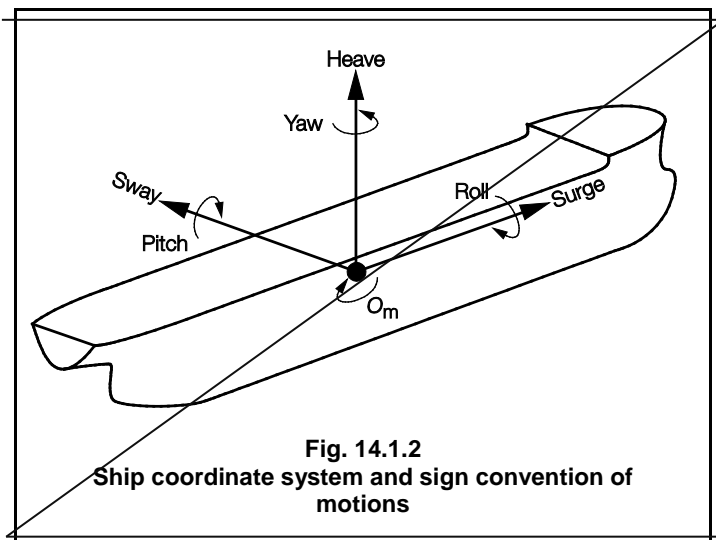
■ Section 1 General

1.5 Symbols and definitions

(Part only shown)

1.5.1 The following definitions are applicable to this Chapter, except where otherwise stated:

Z_{om} = vertical centre of motion above the keel. To be taken as the greater of $2T_c/3 + KG/3$ above the keel, T_c or $D/2$



Part 3, Chapter 14

■ Section 3 Loose container securing fittings, materials and testing

3.3 Prototype testing

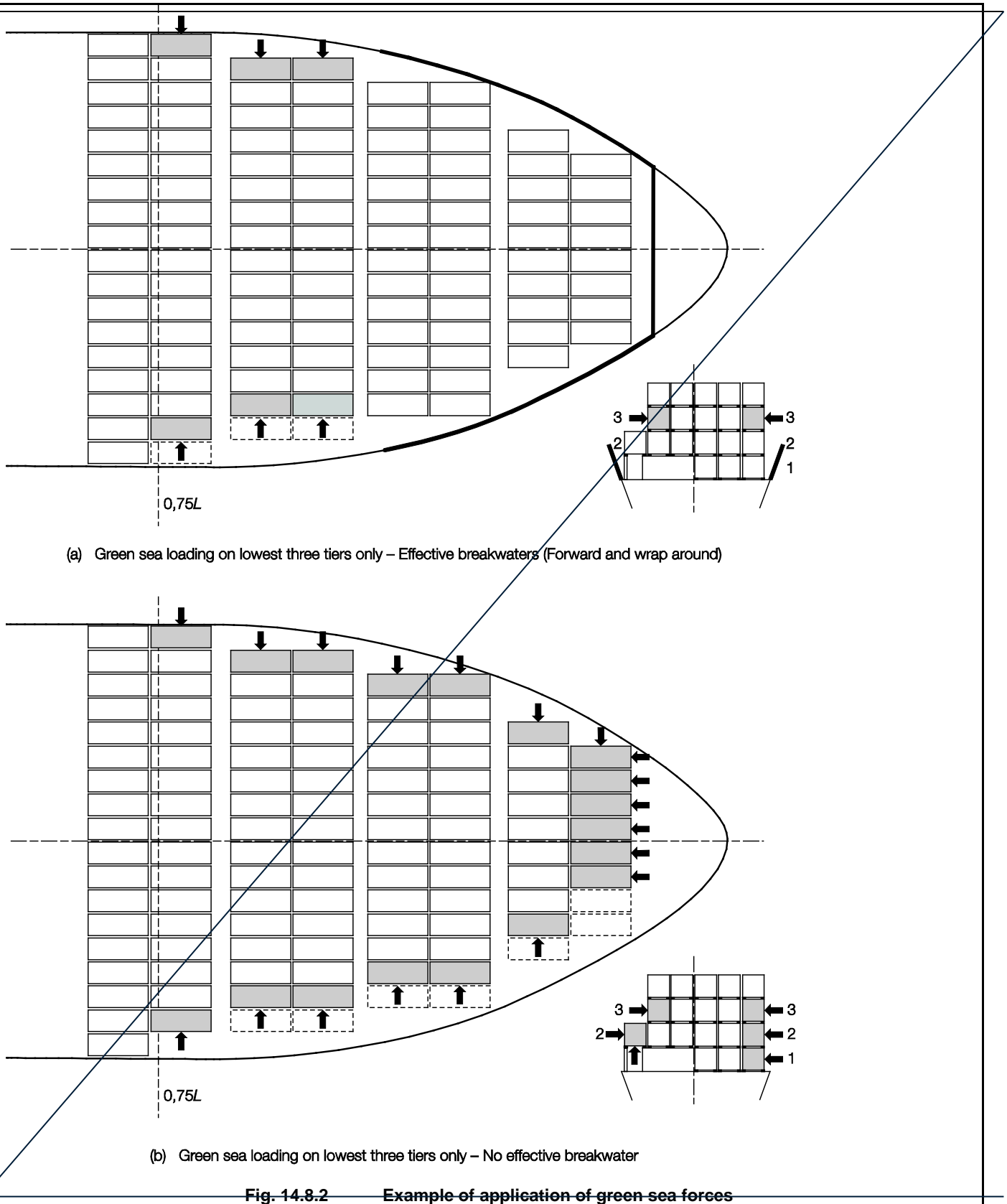
Table 14.3.1 Design breaking loads and proof loads for loose container securing fittings

Item	Min. proof load		Min. design breaking load	
	SWL \leq 400 kN	SWL > 400 kN	SWL \leq 400 kN	SWL > 400 kN
Lashings				
Wire rope			3 x SWL	
Rod: higher tensile steel	1,5 x SWL	SWL + 200 kN	2 x SWL	SWL + 400 Kn
Chain: mild steel			3 x SWL	
higher tensile steel			2,5 x SWL	
higher tensile steel				
Other loose container securing fittings	1,5 x SWL		2 x SWL	
NOTES <ol style="list-style-type: none"> Higher tensile steel is defined for this purpose as steel having a yield stress not less than 315 N/mm². Breaking and proof loads for lashings of material other than steel will be considered. 				

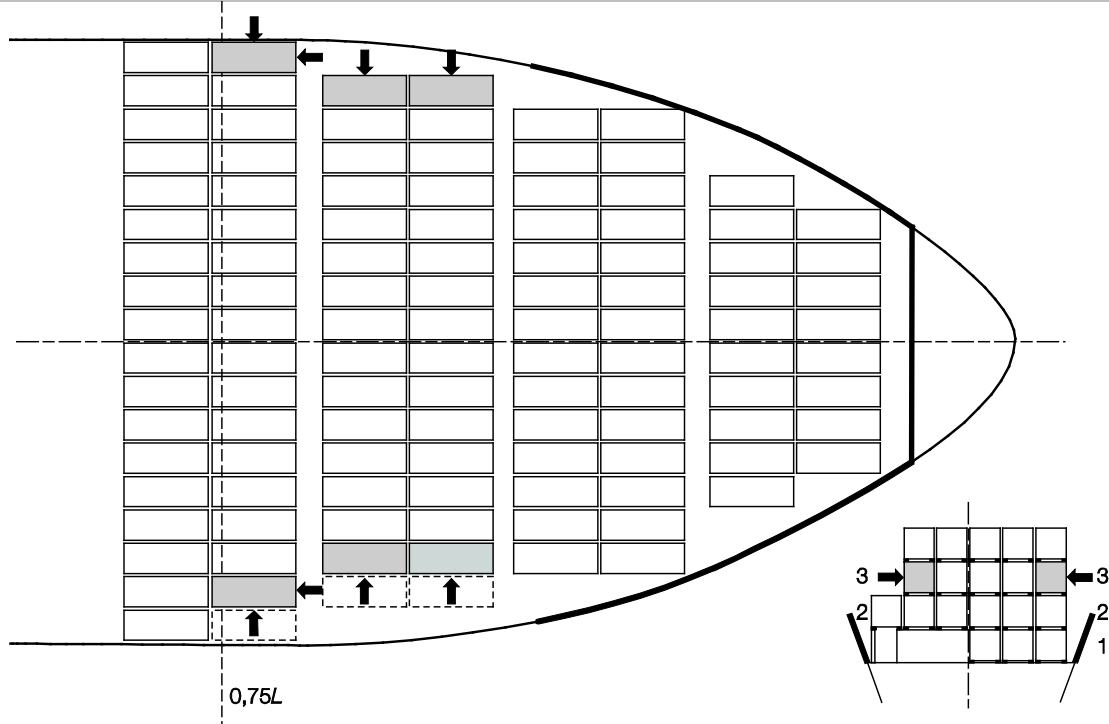
Part 3, Chapter 14

■ Section 8 Determination of forces for container securing arrangements

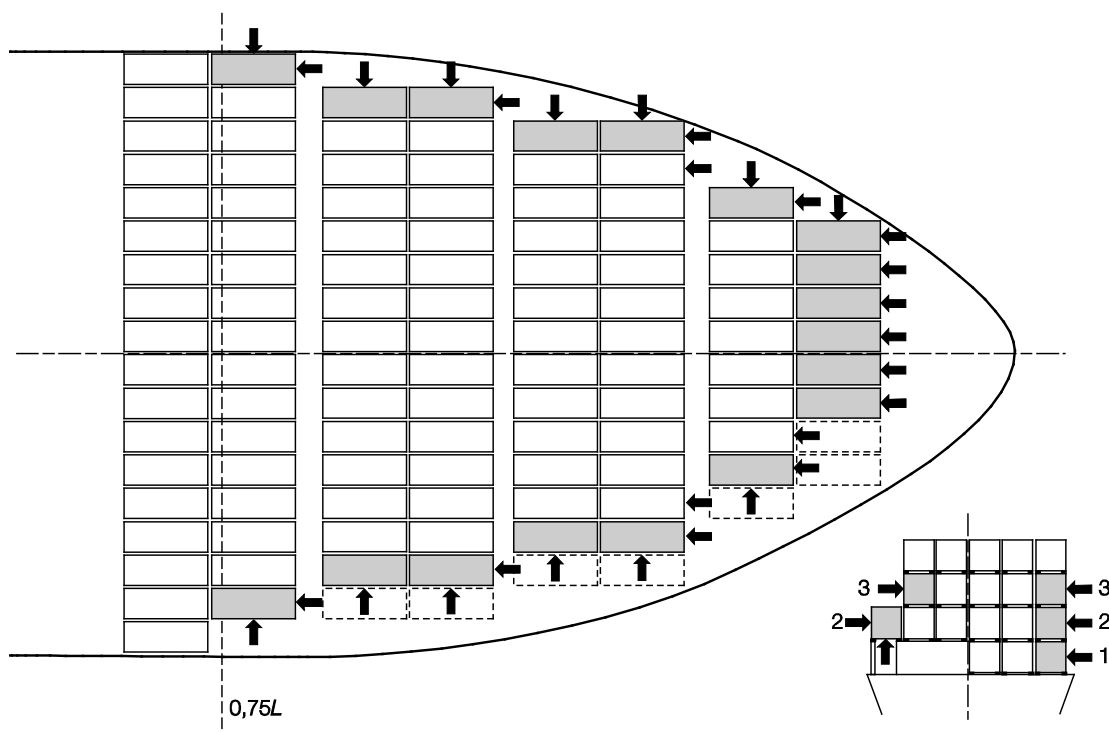
8.2 Ship motion, wind and green sea forces acting on containers



Part 3, Chapter 14



(a) Green sea loading on lowest three tiers only – Effective breakwaters (Forward and wrap around)



(b) Green sea loading on lowest three tiers only – No effective breakwater

Fig. 14.8.2 Example of application of green sea forces

Part 3, Chapter 14

■ Section 9 Strength of container securing arrangements

9.5 Forces in the lashing devices

(Part only shown)

9.5.1 The tensile or compressive force in a lashing device is given by:

$$TL_r = \varepsilon_{Lr} K_{Lr} \text{ kN}$$

The lashing device force in the positive transverse direction (i.e., positive to port) is given by:

$$TL_{yr} = \varepsilon_{Lr} K_{Lr} \cos \theta_{Lr} \sin \theta_{Lxyr} \text{ kN}$$

The lashing device force in the positive longitudinal direction (i.e., positive forwards) is given by:

$$TL_{xr} = \varepsilon_{Lr} K_{Lr} \cos \theta_{Lr} \sin \theta_{Lxyr} \text{ kN}$$

where

k_{Lr} = stiffness of lashing rod or device r , in kN/mm, see 9.4.1.

Part 4, Chapter 1

General Cargo Ships

Corrigenda

■ Section 5 Shell envelope plating

5.1 General

5.1.2 For ships intended to load or unload while aground, see Pt 3, Ch 9, 9.7.

■ Section 6 Shell envelope framing

6.1 General

6.1.5 For ships intended to load or unload while aground, see Pt 3, Ch 9, 9.7.

■ Section 7 Single bottom structure

7.1 General

7.1.4 For ships intended to load or unload while aground, see Pt 3, Ch 9, 9.7.

■ Section 8 Double bottom structure

8.2 General

8.2.6 For ships intended to load or unload while aground, see Pt 3, Ch 9, 9.7.

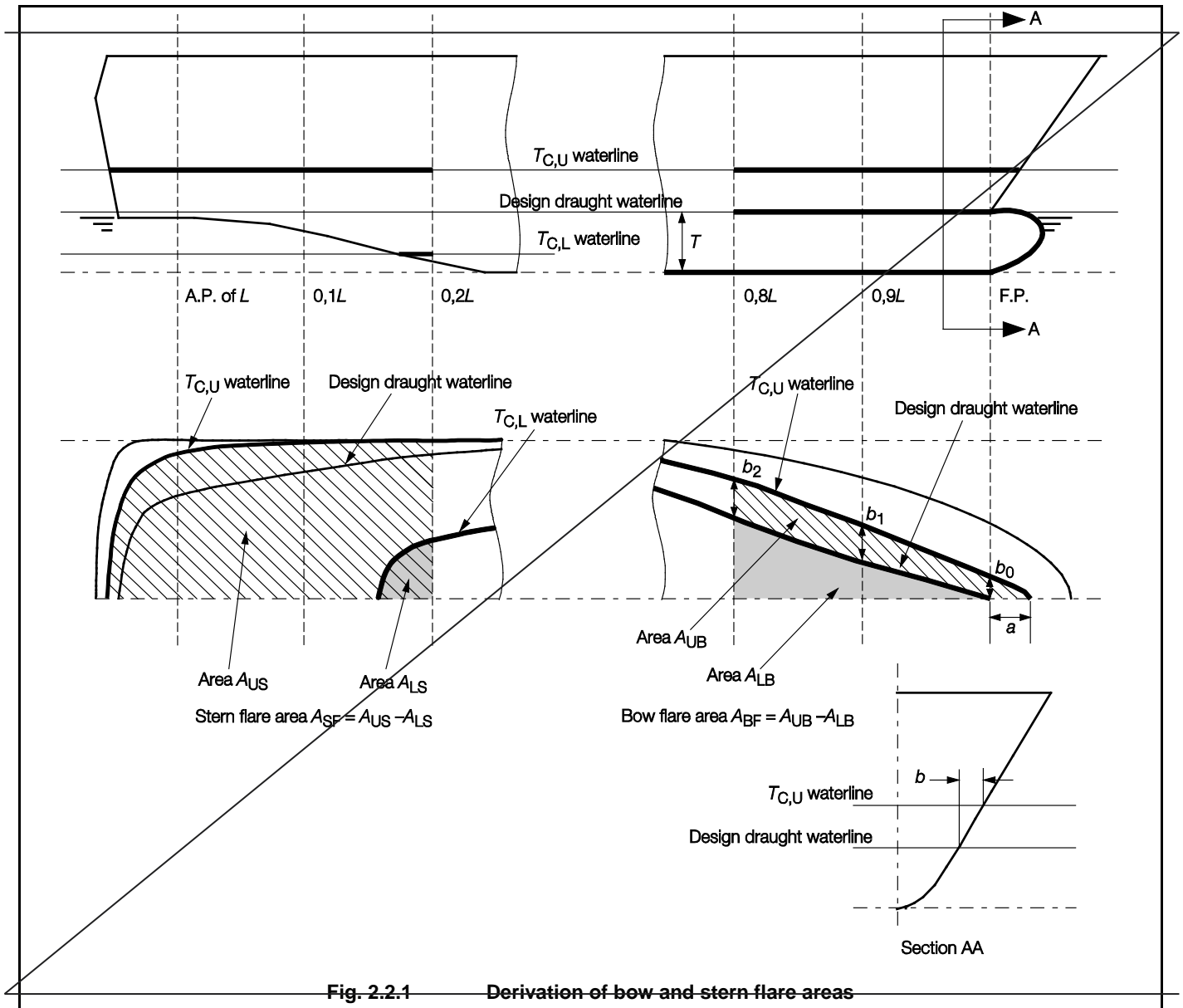
Part 4, Chapter 2

Ferries, Roll on-Roll Off Ships and Passenger Ships

Corrigendum

■ Section 2 Longitudinal strength

2.4 Design vertical wave bending moments



Part 4, Chapter 2

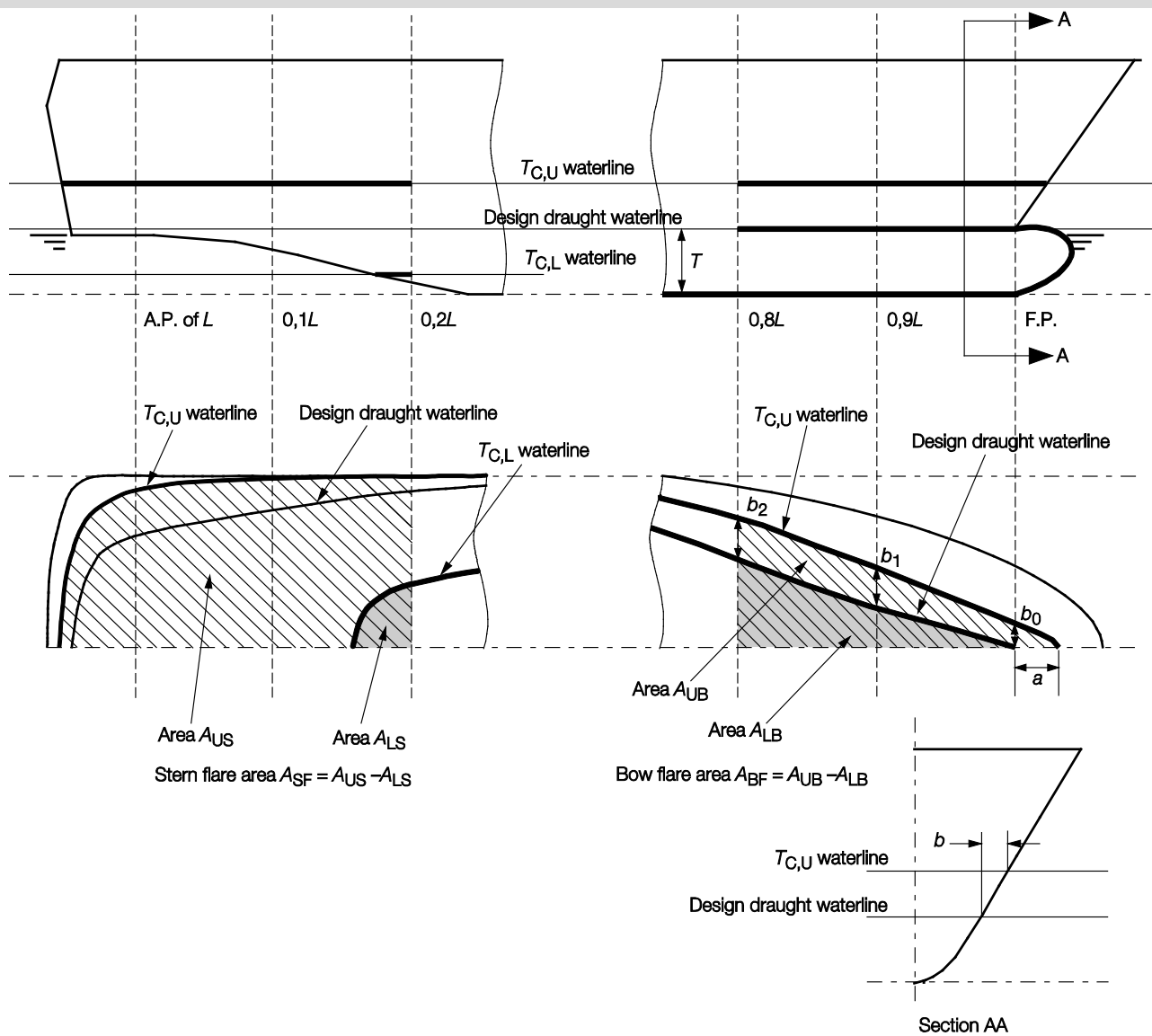


Fig. 2.2.1 Derivation of bow and stern flare areas

Part 4, Chapter 4

Offshore Support Vessels

Corrigenda

■ Section 8

Transport and handling of limited amounts of hazardous and noxious liquid substances in bulk

8.11 Cargo transfer

8.11.2 The remote ~~shut-down~~ shutdown devices for all cargo pumps and similar equipment, required by 5.6.1.3 of the Rules for Ships for Liquid Chemicals, should be capable of being activated from a dedicated cargo control location which is manned at the time of cargo transfer and from at least one other location outside the cargo area and at a safe distance from it.

8.17 Special requirements for the carriage of liquefied gases

8.17.5 Emergency shut-off valves should be provided in liquid outlet lines from each liquefied gas tank. The controls for the emergency shut-off valves should meet the requirements given in 8.10.2 for remote ~~shut-down~~ shutdown devices.

8.19 Emergency remote ~~shut-down~~ shutdown

8.19.1 In the case of transfer operations involving pressures in excess of 5 MPa, arrangements for emergency depressurising and disconnection of the transfer hose should be provided. The controls for activating emergency depressurisation and disconnection of the transfer hose should meet the requirements given in 8.11.2 for remote ~~shut-down~~ shutdown devices.

Part 4, Chapter 5

Barges and Pontoons

Corrigendum

■ Section 6

Bottom strengthening for loading and unloading aground

6.1 Application

6.1.1 For barges or pontoons intended to load or unload while aground, see Pt 3 Ch ~~9,8~~ 9,7.

Part 4, Chapter 7

Bulk Carriers

Effective Date 1 July 2015

■ Section 1

General

1.3 General class notations

(Part only shown)

1.3.1 Class notations applicable to CSR bulk carriers are defined as follows:

- **CSR**

Identifies the bulk carrier as being compliant with the *IACS Common Structural Rules for Bulk Carriers and Oil Tankers (CSR)*.

Part 4, Chapter 7

1.4 Class notation for CSR bulk carriers

(Part only shown)

1.4.1 In general, CSR bulk carriers less than 150 m in length are to comply with the requirements of 1.6, Pt 3, Ch 2 and the *IACS Common Structural Rules for Bulk Carriers* (CSR) and will be eligible for one of the following mandatory class notations:

(Part only shown)

1.4.2 In general, CSR bulk carriers equal to or greater than 150 m in length are to comply with the requirements of 1.6, Pt 3, Ch 2 and the *IACS Common Structural Rules for Bulk Carriers* (CSR) and will be eligible for one of the following mandatory class notations:

1.4.3 The following additional notations and annotations are to be provided giving further detailed description of limitations to be observed during operation as a consequence of the design loading condition applied during the design.

- **Notations:**
(**maximum cargo density (in tonnes/m³)**) For notations **BC-A** and **BC-B** if the maximum cargo density is less than 3,0 tonnes/m³,
(**no MP**) For all notations when the vessel has not been designed for loading and unloading in multiple ports in accordance with the conditions specified in *IACS Common Structural Rules for Bulk Carriers* (CSR), Ch 4, 7.3.3 Pt 1, Ch 4, Sec 8.4.2.2;
GRAB [X] where the net thickness of inner bottom, lower strake of hopper tank sloping plate and transverse lower stool plating comply with *IACS Common Structural Rules for Bulk Carriers* (CSR), Ch 12, 4 Pt 2, Ch 1, 6 for **BC-A** and **BC-B**, see also CSR Ch 1, 1 *IACS Common Structural Rules* (CSR), Pt 1, Ch 1, Sec 1.3.2.1;
- **Annotations:**
(allowed combination of specified empty holds). For notation **BC-A**.

Corrigenda

■ Section 2 Materials and protection

2.2 Protection of steelwork

2.2.3 For the notation '**strengthened for regular discharge by heavy grabs**', see Pt 3, Ch 9, 8 9, 7.

■ Section 8 Double bottom structure

8.1 General

(Part only shown)

8.1.5 For all bulk carriers where bulk cargoes are discharged by grabs the maximum recommended unladen weight of the grab corresponding to the approved inner bottom plating thickness is to be calculated using the following formulae:

$$P = \left(\frac{s}{k} \right)^2 \frac{10^d}{1,775} \text{ tonnes}$$

where:

k = higher tensile steel factor as defined in 1.7.1 1.8.1

(Part only shown)

Table 7.8.1 Strengthening for heavy cargo equipment

Item	Requirement
(3) Inner bottom plating, see Note 3	The thickness of the inner bottom plating in the holds is to be not less than required by the greatest of the following: (d) In way of ballast holds the scantlings are also to satisfy the requirements for deep tanks in Table 1.9.1 in Chapter 1, with the load head h_4 , in metres, measured to the deck at centre, but see also Pt 3, Ch 9, 8 9, 7 if protection against heavy grab is desired

Part 4, Chapter 7

■ Section 9 Hopper side tank structure

9.2 Sloped bulkhead plating

9.2.2 Where the ship is regularly discharged by grabs and the optional notation for heavy grabs is not desired (see Pt 3, Ch 9, 9.7), the increase in thickness, as required by Ch 1, 2.2, is to be tapered from the inner bottom knuckle to nil at the top corner of the tank.

Part 4, Chapter 9 Double Hull Oil Tankers

Effective Date 1 July 2015

■ Section 1 General

1.3 Class notation and applicable Rules for CSR Double Hull Oil Tankers

1.3.1 In general, CSR Double Hull Oil Tankers are to comply with 1.3.2 to 1.3.7 and the *IACS Common Structural Rules for Double Hull Oil Tankers Bulk Carriers and Oil Tankers* (CSR) for the draught required and will be eligible to be classed **100A1 Double Hull Oil Tanker CSR, ESP**.

1.3.2 Class notations applicable to CSR double hull oil tankers are defined as follows:

- **CSR**

Identifies the double hull oil tanker as being compliant with the *IACS Common Structural Rules for Double Hull Oil Tankers* **IACS Common Structural Rules (CSR)**

1.6 Information required for CSR Double Hull Oil Tankers

1.6.1 In addition to the plans required by *IACS Common Structural Rules for Double Hull Oil Tankers* (CSR) **IACS Common Structural Rules (CSR)** the following additional plans and information is to be submitted:

- Rudder, stock and tiller;
- Ice Strengthening.
- Freeboard plan or equivalent showing freeboards and items relative to the conditions of assignment.

Part 4, Chapter 9

Corrigendum

- *Section 9*
Primary members supporting longitudinal framing
- 9.3 **Girders and floors in double bottom**
- 9.3.8 For ships intended to load or unload while aground, see Pt 3, Ch 9, ~~9.8~~ **9.7**.

Part 4, Chapter 10

Single Hull Oil Tankers

Corrigendum

- *Section 1*
General
- 1.1 **Application**
- 1.1.2 For tankers intended to load or unload whilst aground, see Pt 3, Ch 9, ~~9.8~~ **9.7**.

Part 4, Chapter 11

Ore Carriers

Corrigenda

- *Section 6*
Double bottom construction
- 6.1 **General**
- 6.1.4 For all vessels intended to be unloaded by grabs, the thickness of inner bottom plating is to meet the requirements of Pt 3, Ch 9, ~~9.2.4(a)~~ **9.8.2.1(a)** for a maximum design grab weight specified and recorded in the Loading Manual. For vessels of deadweight >200 000 tonnes, the design grab weight is not to be less than 25 tonnes.
- *Section 8*
Transverse bulkheads
- 8.3 **Transverse watertight bulkheads in centre holds**
- 8.3.4 Where inner bottom plating is increased as required by 6.1.4, the lower part of the transverse bulkhead should also be increased in accordance with Pt 3, Ch 9, ~~9.4.4~~ **9.8.4.1**.

Part 5, Chapter 1

General Requirements for the Design and Construction of Machinery

Corrigendum

■ Section 6 Quality Assurance Scheme for Machinery

6.1 General

6.1.2 This QAM Scheme is applicable to items manufactured under closely controlled conditions. A list of ~~The~~ products for which the QAM Scheme is applicable ~~is~~ **are** provided in LR's ShipRight Procedure *Approval of a Manufacturer according to the Quality Assurance Scheme for Machinery*.

Part 5, Chapter 2

Reciprocating Internal Combustion Engines

Corrigenda

■ Section 7 Control and monitoring of main, auxiliary and emergency engines

7.1 General

(Part only shown)

7.1.2 Oil mist detection, or engine bearing temperature monitors or alternative methods for crankcase protection are to be provided:

- (a) When arrangements are fitted to override the automatic ~~shut-down~~ **shutdown** for excessive reduction of the lubricating oil supply pressure.
- (b) For engines of 2250 kW and above or having cylinders of more than 300 mm bore.

NOTES

- 3. Where arrangements are made to override the automatic slow-down or ~~shut-down~~ **shutdown** due to high oil mist or bearing temperature, the override is to be independent of other overrides.
- 4. Where the bearing temperature monitoring method is chosen, all bearings in the crankcase are to be monitored where practicable, e.g., main, crankpin, crosshead.

7.2 Main engine governors

7.2.2 ~~Oil engines~~ **Engines** coupled to electrical generators which are the source of power for main electric propulsion motors are to comply with the requirements for auxiliary engines in respect of governors and overspeed protection devices.

7.5 Unattended machinery

7.5.4 Where a first stage alarm together with a second stage alarm and automatic ~~shut-down~~ **shutdown** of machinery are required in the relevant Tables of this Section, the sensors and circuits utilised for the second stage alarm and automatic ~~shut-down~~ **shutdown** are to be independent of those required for the first stage alarm.

7.6 Engines for propulsion purposes

7.6.3 Alarms are to operate, and automatic ~~shut-down~~ **shutdown** of machinery is to occur for the fault conditions shown in Table 2.7.1(b).

(Part only shown)

Table 2.7.1(a) Engines for propulsion purposes: Alarms and slow-downs

NOTES

- 7. Where the outlet temperature for each bearing cannot be measured due to the design, details of alternative proposals in accordance with the ~~turbo-charger~~ **turbocharger** manufacturer's instructions may be submitted for consideration.

Part 5, Chapter 2

7.7 Auxiliary engines

(Part only shown)

Table 2.7.2 Auxiliary engines: Alarms and safeguards

Item	Alarm	Note
Lubricating oil inlet temperature	High	–
Lubricating oil inlet pressure	1st stage low	–
	2nd stage low	Automatic shut-down shutdown of engine, see 7.5.4
Oil mist concentration in crankcase or bearing temperature	High	Automatic shut-down shutdown of engine, see 7.1.2
Coolant outlet temperature (for engines >220 kW)	1st stage high	–
	2nd stage high	Automatic shut-down shutdown of engine, see 7.5.4
Overspeed	High	Automatic shut-down shutdown of engine, see also 7.4. Details of alternative proposals in accordance with the manufacturer's instructions may be submitted for consideration

7.8 Emergency engines

7.8.5 In addition to the fuel oil control from outside the space, a local means of engine shut-down shutdown is to be provided.

(Part only shown)

Table 2.7.3 Emergency engines: Alarms and safeguards

Item	Alarm for engine power <220 kW	Alarm for engine power ≥220 kW	Note
Overspeed	–	High	Automatic shut-down shutdown

■ Section 9 Starting arrangements

9.2 Air receiver capacity

9.2.1 Where the main engine is arranged for air starting the total air receiver capacity is to be sufficient to provide without replenishment, not less than 12 consecutive starts of the main engine, alternating between ahead and astern if of the reversible type and not less than 6 consecutive starts if of the non-reversible type. At least two air receivers of approximately equal capacity are to be provided. For scantlings and fittings of air receivers, see Chapter 44 12.

■ Section 11 Factory Acceptance Test and Shipboard Trials of Internal Combustion Engines

11.1 Safety

11.1.1 Before any test is carried out, all safety functions are to be operational to ensure the safety of the attending personnel is to be made available by the manufacturer/shipyard and is to be operational. all relevant equipment for the safety of attending personnel is to be made available by the manufacturer/shipyard and is to be operational. This is to include crankcase explosive conditions protection, overspeed protection and any other shutdown function.

11.2 General

11.2.4 Adequate test bed facilities for loads as required in Table 2.11.1 are to be provided. All fluids used for testing purposes such as fuel, lubrication oil and cooling water are to be suitable for the purpose intended, e.g., they are to be clean, and if necessary pre-heated to achieve the recommended operating temperature, if necessary, and cause no harm to engine parts. This applies to all fluids used temporarily or repeatedly for testing purposes only.

Part 5, Chapter 2

(Part only shown)

Table 2.11.1 Scope of works trials for engines

Main engines driving propellers and waterjets		
Trial condition	Duration	Note
Shut down Shutdown device	–	See 7.4

11.3 Works trials (factory acceptance test)

11.3.3 For all stages of the works trials the pertaining operation values are to be measured and recorded by the engine manufacturer. All results are to be compiled in an acceptance protocol to be issued by the engine manufacturer. ~~The crankshaft deflection is to be checked when this check is required by the manufacturer during the operating life of the engine. Crankshaft deflection measurements are to be taken before and after works acceptance trials.~~ Where the engine designer requires through life monitoring of crankshaft deflections, such measurements are also to be taken before and after works acceptance trials in accordance with the engine designer's requirements.

~~11.3.7 Turbocharger surge margin for propulsion engines is to be demonstrated as required by 12.9.2.~~

Paragraphs 11.3.8 to 11.3.12 have been renumbered 11.3.7 to 11.3.11.

■ Section 13 Air compressors

13.1 General requirements

13.1.2 Two or more air compressors are to be fitted having a total capacity, together with a topping-up compressor where fitted, capable of charging the air receivers within 1 hour from atmospheric pressure, to the pressure sufficient for the number of starts required by ~~46.42 9.2~~. At least one of the air compressors is to be independent of the main propulsion unit and the capacity of the main air compressors is to be approximately equally divided between them. The capacity of an emergency compressor which may be installed to satisfy the requirements of 9.1 is to be ignored.

Part 5, Chapter 3

Steam turbines

Corrigenda

■ Section 6 Control and monitoring of main and auxiliary steam turbines

6.4 Unattended machinery

6.4.4 Where a first stage alarm together with a second stage alarm and automatic ~~shut-down shutdown~~ of machinery are required in the relevant Tables of this Section, the sensors and circuits utilised for the second stage alarm and automatic shutdown are to be independent of those required for the first stage alarm.

6.5 Steam turbine machinery for propulsion purposes

(Part only shown)

Table 3.6.1 Steam turbine machinery: Alarms and safeguards

Item	Alarm	Note
Lubricating oil pressure	1st stage low	–
	2nd stage low	Automatic shut-down shutdown, see 6.4.4
Axial movement of turbine rotor	High	Shut-down Shutdown or speed reduction or turbine(s)

Part 5, Chapter 3

6.6 Auxiliary steam turbines

(Part only shown)

Table 3.6.2 Auxiliary engines and auxiliary steam turbines: Alarms and safeguards

Item	Alarm	Note
Lubricating oil inlet pressure	1st stage low	–
	2nd stage low	Automatic shut-down shutdown of turbine, see 6.4.4
Condenser vacuum	Low	
Axial displacement of rotor	High	Automatic shut-down shutdown of turbine, see 6.4.4

Part 5, Chapter 4

Gas turbines

Corrigenda

■ Section 8 Control, alarm and safety systems

8.6 Hand trip arrangement

8.6.1 Means are to be provided, at both the local and remote control/operating positions, to manually initiate the shut-down shutdown of the gas turbine in an emergency.

8.8 Unattended machinery

8.8.4 Where a first stage alarm together with a second stage alarm and automatic shut-down shutdown of machinery are required in the relevant Tables of this Section, the sensors and circuits utilised for the second stage alarm and automatic shut-down shutdown are to be independent of those required for the first stage alarm. LR will consider alternative arrangements which provide an equivalent level of safety.

8.9 Gas turbine machinery

(Part only shown)

Table 4.8.1 Gas turbine machinery: Alarms and safeguards

Item	Alarm	Note
Overspeed	High	Automatic shut-down shutdown, see also 8.2
Power turbine inlet temperature	1st stage high	Automatic power reduction
	2nd stage high	Automatic shut-down shutdown, see also 8.3
Flame failure	Failure	Automatic shut-down shutdown, see also 8.4
Failure to ignite	Failure	Automatic shut-down shutdown, see also 8.4
Lubricating oil pressure	1 st stage low	–
	2 nd stage low	Automatic shut-down shutdown, see also 8.5
Scavenge oil pressure	Low	Automatic shut-down shutdown
Turbine vibration	1 st stage high	–
	2 nd stage high	Automatic shut-down shutdown, see also 4.2
Automatic starting	Failure	Automatic shut-down shutdown
Control system	Failure	Automatic shut-down shutdown

Part 5, Chapter 5

Gearing

Corrigenda

■ Section 3 Design

3.1 Symbols

3.1.1 For the purposes of this Chapter the following symbols apply:

~~Q~~ = accuracy grade derived from ISO 1328 — ~~Cylindrical gears~~ — ~~ISO system of accuracy~~

3.5 Tooth loading for bending stress

3.5.2 Tooth form factor, Y_F :

where

~~$$\varepsilon_{an} = \frac{\varepsilon_a}{\cos^2 \beta_b}$$~~

$$\varepsilon_{an} = \frac{\varepsilon_a}{\cos^2 \beta_b}$$

■ Section 6 Control and monitoring

6.2 Unattended machinery

6.2.3 Where a first stage alarm together with a second stage alarm and automatic ~~shut-down~~ shutdown of machinery are required in the relevant Tables of this Section, the sensors and circuits utilised for the second stage alarm and automatic ~~shut-down~~ shutdown are to be independent of those required for the first stage alarm.

(Part only shown)

Table 5.6.1 Main and auxiliary gear units: Alarms and safeguards

Item	Alarm	Note
Lubricating oil inlet pressure*	2nd stage low	Automatic shut-down shutdown

Part 5, Chapter 8

Shaft Vibration and Alignment

Corrigendum

■ Section 2 Torsional vibration

2.5 Limiting stress in propulsion shafting

2.5.3 In no part of the propulsion shafting system may the alternating torsional vibration stresses exceed the values of τ_c for continuous operation, and τ_t for transient running, given by the following formulae:

$$\tau_c = \frac{\sigma_u + 160}{18} C_k C_d (3 - 2r^2) \text{ for } r < 0,9 \text{ N/mm}^2$$

$$\tau_c = \frac{\sigma_u + 160}{18} C_k C_d 1,38 \text{ for } 0,9 \leq r < 1,05 \text{ N/mm}^2$$

$$\tau_t = \pm 1,7 \tau_c \frac{1}{\sqrt{C_k}} \text{ for } r \leq 0,8$$

For $r < 0,9$:

$$\tau_c = \frac{\sigma_u + 160}{18} C_k C_d (3 - 2r^2) \text{ N/mm}^2$$

And where $r < 0,8$:

$$\tau_t = \pm 1,7 \tau_c \frac{1}{\sqrt{C_k}} \text{ N/mm}^2$$

For $0,9 \leq r \leq 1,05$:

$$\tau_c = \frac{\sigma_u + 160}{18} C_k C_d 1,38 \text{ N/mm}^2$$

Part 5, Chapter 9

Podded Propulsion Units

Corrigendum

■ Section 8 Control engineering systems

8.2 Monitoring and alarms

8.2.7 Condition monitoring arrangements are not to interface with the operation of safety systems which may cause slow-down or ~~shut down~~ shutdown of the propulsion system. See also Pt, 6, Ch 1,2.6.8.

Part 5, Chapter 10

Steam Raising Plant and Associated Pressure Vessels

Corrigenda

■ Section 1 General requirements

1.13 Exhaust gas economiser/boiler arrangements

1.13.2 A ~~design statement~~ **Design Statement** demonstrating compliance with the requirements of 1.13.1 or alternative means of preventing the accumulation of soot or overheating, such as the use of exhaust gas bypass ducting with automatic flap valve arrangements and/or effective soot prevention and cleaning systems, is to be submitted for approval.

■ Section 18 Control and monitoring

18.2 Unattended machinery

18.2.4 Where a first stage alarm together with a second stage alarm and automatic ~~shut-down~~ **shutdown** of machinery are required in the relevant Tables of this Section, the sensors and circuits utilised for the second stage alarm and automatic ~~shut-down~~ **shutdown** are to be independent of those required for the first stage alarm.

18.3 Main, auxiliary and other boilers

18.3.9 Following burner ~~shut-down~~ **shutdown**, the furnace is to be purged automatically for at least the required pre-purging time. In the event of ~~shut-down~~ **shutdown** due to activation of a required safeguard, this purging is to be manually initiated.

Part 5, Chapter 12

Piping Design Requirements

Corrigendum

■ Section 6 Valves

6.1 Design requirements

6.1.4 Where valves are required to be capable of being closed remotely in the event of fire, the valves, including their ~~control gear~~ **controlgear**, are to be of steel construction or of an acceptable fire tested design.

Part 5, Chapter 13

Ship Piping Systems

Corrigendum

■ Section 11 Ballast system

11.2 Integrated cargo and ballast systems

11.2.3 Controls to stop the cargo system, including normal controls and emergency stop and safety ~~shut-downs~~ **shutdowns**, are not to prevent operation of the ballast system.

Part 5, Chapter 14

Machinery Piping Systems

Corrigenda

■ Section 12

Control, alarm and safety systems of machinery

12.1 General

12.1.4 Where a first stage alarm together with a second stage alarm and automatic ~~shut-down~~ shutdown of machinery are required in the relevant Tables of this Section, the sensors and circuits utilised for the second stage alarm and automatic ~~shut-down~~ shutdown are to be independent of those required for the first stage alarm.

12.2 Thermal fluid heaters

12.2.8 Following burner ~~shut-down~~ shutdown, the furnace is to be purged automatically for at least the required pre-purging time. In event of ~~shut-down~~ shutdown due to activation of a required safeguard, this purging is to be manually initiated.

12.4 Miscellaneous machinery

(Part only shown)

Table 14.12.3 Miscellaneous machinery: Alarms and safeguards

Item	Alarm	Note
Air compressor lubricating oil	Failure	Automatic shut-down shutdown

Part 5, Chapter 15

Piping Systems for Oil Tankers

Corrigenda

■ Section 7

Inert gas systems

7.1 General

7.1.8 Automatic ~~shut-down~~ shutdown of the oil-fuel ~~fuel oil~~ supply to inert gas generators is to be arranged on predetermined limits being reached with respect to low water pressure or low water flow rate to the cooling and scrubbing arrangement and with respect to high gas temperature.

7.1.9 Automatic ~~shut-down~~ shutdown of the gas regulating valve is to be arranged with respect to failure of the power supply to the oil fired inert gas generators.

7.8 Instrumentation and alarms

7.8.11 Automatic ~~shut-down~~ shutdown of the inert gas blowers and gas regulating valve is to be arranged on predetermined limits being reached in respect of (a), (b) and (c) of 7.8.9.

7.8.12 Automatic ~~shut-down~~ shutdown of the gas regulating valve is to be arranged in respect of 7.8.9 (d).

7.8.16 An audible alarm system independent of that required in 7.8.9 (h) or automatic ~~shut-down~~ shutdown of cargo pumps is to be provided to operate on predetermined limits of low pressure in the inert gas mains being reached.

7.10 Nitrogen generator systems

7.10.18 Automatic ~~shut-down~~ shutdown of the system is to be arranged upon alarm conditions as required by 7.10.17(a) to (e).

Part 5, Chapter 24

Emissions Abatement Plant for Combustion Machinery

Corrigenda

■ Section 3 Information to be submitted

3.3 Chemical substances

(Part only shown)

3.3.7 The flow and return flow of chemicals, substances, effluent or by-products, including:

- (b) The process plant parameters and analysis of conditions under which emergency ~~shut-down~~ shutdown will be initiated.
- (d) The proposed emergency procedures for controlled ~~shut-down~~ shutdown of the plant, i.e., depressurising, isolating and the arrangements for the continued operation of the essential services necessary to allow for such controlled ~~shut-down~~ shutdown under the emergency conditions identified in 3.3.7(b), as applicable.

3.7 Electrical and control equipment

3.7.8 Schedule of the parameters which are monitored and controlled, including alarms and ~~shut-down~~ shutdown devices.

■ Section 6 Mechanical equipment

6.5 Protection of combustion machinery

6.5.1 Measures are to be implemented to ensure that water from the emissions abatement plant cannot flow back into engine ~~turbo-charger(s)~~ turbocharger(s) or other machinery.

6.5 Protection of combustion machinery

6.5.3 Where chemicals or substances are injected into the exhaust gas stream before ~~turbo-charger(s)~~ turbocharger(s) or emissions abatement plant are fitted, this is not to present a risk of damage, chemical attack or performance degradation to the ~~turbo-charger(s)~~ turbocharger(s) or engine(s) or machinery with which they are associated.

■ Section 9 Electrical and control equipment

9.1 General

9.1.5. Process tanks which form part of the operating loop of any emissions abatement equipment are to have a high level alarm, in accordance with Table ~~9.1.9~~ 24.9.1. Effluent tanks which are not part of the normal process loop and which are used for storage of effluent or substances prior to discharge from the vessel are to be protected, in accordance with Table ~~9.1.9~~ 24.9.1.

9.1.8. Alarms and safeguards are to be provided for the critical system parameters in order to avoid danger to crew and machinery. As a minimum, the alarms and safeguards listed in Table ~~9.1.9~~ 24.9.1 are to be fitted. Where these Rules require alarms and also trip protection to be fitted, the alarm and trip are to be independent of each other.

(Part only shown)

Table ~~9.1.9~~ 24.9.1 Machinery emissions to air abatement plant: alarms and safeguards

NOTES

1. Only where a by-pass valve is fitted, see 3.3.5. This valve shall open to the by-pass position as part of the unit ~~shut-down~~ shutdown logic.

Part 6, Chapter 1

Control Engineering Systems

Corrigenda

■ Section 1 General requirements

1.2 Documentation required for design review

(Part only shown)

1.2.6 **Programmable electronic systems.** In addition to the documentation required by 1.2.2 the following is to be submitted:

(g) Software production plans, including applicable procedures, see ~~4.4~~ 2.10.20.

■ Section 2 Essential features for control, alarm and safety systems

2.13 Programmable electronic systems – Additional requirements for essential services and safety critical systems

2.13.3 Items of programmable electronic equipment used to implement control, alarm or safety functions are to be Type Approved in accordance with LR's *Type Approval System Test Specification Number 1* (~~2002~~ 2013). Type approval to an alternative and relevant National or International Standard may be submitted for consideration.

2.10 Programmable electronic systems – General requirements

2.10.20 Software lifecycle *activities*, e.g., design, development, supply and maintenance, are to be carried out in accordance with an acceptable quality management system. ~~Software~~ Project specific software quality plans are to be submitted. These are to demonstrate that the provisions of ISO/IEC 90003: Software engineering – *Guidelines for the application of ISO 9001:2000 to computer software*, or equivalent, are incorporated. The plans are to define responsibilities for the lifecycle activities, including verification, validation, module testing and integration with other components or systems.

Part 6, Chapter 2

Electrical Engineering

Corrigendum

■ Section 1 General requirements

1.19 Programmable electronic systems

1.19.2 Where ~~4.4.4~~ 1.19.1 applies, proposed modifications to software and acceptance testing and trials are to be in accordance with Ch 1, 1.4 and Section 7 as applicable.

Part 7, Chapter 4

Dynamic Positioning Systems

Corrigenda

■ Section 2

Class notation DP(CM)

2.3 Electrical systems

(Part only shown)

2.3.12 Essential services are to be served by individual circuits. Essential services that are duplicated are:

- (c) not to depend upon common feeders, transformers, converters, protective devices, control circuits or ~~control gear~~ controlgear assemblies to operate.

■ Section 4

Class notation DP(AA)

4.1 Requirements

4.1.1 For assignment of **DP(AA)** notation, the applicable requirements of Sections 2 and 3, together with 4.1.2 to ~~4.1.10~~ 4.1.11 are to be complied with.

4.1.2 Power, control and thruster systems and other systems necessary for, or which could affect, the correct functioning of the DP system are to be provided and configured such that a fault in any active component or system will not result in a loss of position. This is to be verified by means of a FMEA, see 1.3.6. Such components may include, but are not restricted to, the following:

- Switchgear and ~~control gear~~ controlgear, including their assemblies.

■ Section 5

Class notation DP(AAA)

5.1 Requirements

5.1.1 For assignment of **DP(AAA)** notation, the applicable requirements of Sections 2, 3 and 4, together with 5.1.2 to ~~5.1.12~~ 5.1.3 are to be complied with.

Part 7, Chapter 13

On-shore Power Supplies

Corrigenda

■ Section 3

Electrical Connection

3.1 General

(Part only shown)

3.1.10 Requirements for an external electrical power supply to be connected are to be defined in the Design Statement and this is to detail the following:

- ~~emergency~~ Emergency ~~Shut-Down~~ Shutdown requirements, see 5.3;

3.5 High voltage in the presence of personnel

(Part only shown)

3.5.2 For high voltage:

- (a) switchgear and ~~control gear~~ controlgear assemblies;

Part 7, Chapter 13

■ Section 5 Control and monitoring

5.1 General

(Part only shown)

5.1.5 Details of proposals that would involve external control of ship equipment to respond to potentially hazardous situations detected externally are to be submitted for consideration. Provided that the arrangements are considered to be in accordance with the provisions of an acceptable and relevant standard, the following external control functions may be permitted:

- initiation of Emergency ~~Shut-Down~~ Shutdown.

5.1.11 Means are to be provided to allow testing of control, alarm and safety system connections with external arrangements, including operation of Emergency ~~Shut-Down~~ Shutdown facilities, before electrical connection to an external power supply.

5.3 Emergency ~~Shut-Down~~ Shutdown

(Part only shown)

5.3.2 Emergency ~~Shut-Down~~ Shutdown facilities are to be provided that, when activated, will instantaneously:

5.3.5 Means are to be provided to detect or predict tension in the external electrical power supply connection cable that activate the Emergency ~~Shut-Down~~ Shutdown facilities described in 5.3.2 before damage occurs. Where alternative arrangements to tension detection are proposed (automatic break-away release, connectors with shear bolts and pilot lines, connection with ship/shore Emergency ~~Shut-Down~~ Shutdown system, etc.), details are to be submitted for consideration.

5.3.6 To detect and react to the withdrawal of plugs from socketoutlets while power supply connections are live, the Emergency ~~Shut-Down~~ Shutdown facilities described in 5.3.2 are to be activated before the necessary degree of protection is no longer achieved or power connections are broken by the removal of a plug from a connected socket-outlet, including in-line connections.

5.3.7 For high-voltage connection points on board where the means of locking together plugs and socket-outlets required by 3.3.4 are not interlocked to prevent removal from the locked position when the Connection Equipment power connections are not discharged so that they are safe to touch, the Emergency ~~Shut-Down~~ Shutdown facilities described in 5.3.2 are to be activated when connected plugs are moved from the locked position. Consideration may be given to relaxing this requirement when evidence is submitted which demonstrates that appropriate controls and procedures acceptable to LR are in place to control personnel access plugs and socket-outlets.

5.3.8 Where connection power plugs are connected to socket-outlets mounted on a switchgear enclosure, arrangements are to be provided to activate the Emergency ~~Shut-Down~~ Shutdown facilities described in 5.3.2 in as short a time as practicable in the event of an arc occurring in the enclosure at the rear of the socket-outlets.

5.3.9 Where 3.1.7(b) applies, the Emergency ~~Shut-Down~~ Shutdown facilities described in 5.3.2 are to be activated in the event of loss of earth connection continuity being detected.

(Part only shown)

5.3.10 Means to manually activate the Emergency ~~Shut-Down~~ Shutdown facilities described in 5.3.2 are to be provided at:

5.3.11 An alarm to indicate activation of the Emergency ~~Shut-Down~~ Shutdown is to be provided at a machinery control station that is attended when connected to an external electrical power supply. The alarm is to indicate the cause of the activation. For power supply restoration, see 4.5.1 to 4.5.3.

■ Section 6 Testing, trials and surveys

6.1 General

6.1.5 Trials are to be conducted when connected to a compatible external electrical power supply in accordance with 3.1.10 to demonstrate to the attending Surveyor that the Rules have been complied with in respect of:

- (e) the operation of electrical load transfer arrangements (including Transfer Time Limit setting), electrical system protection and interlocking devices, Emergency ~~Shut-Down~~ Shutdown arrangements and other safety devices and ship power restoration;

Part 8, Chapter 2

Ice Operations – Ice Class

Effective Date 1 July 2015

■ Section 6

Hull requirements for first-year ice conditions – Ice Classes 1AS FS, 1A FS, 1B FS, 1C FS and 1D

6.6 Renewal criteria within ice strengthening area for CSR ships

6.6.1 For double hull oil tankers and bulk carriers that are compliant with the ~~IACS Common Structural Rules for Double Hull Tankers~~ and ~~IACS Common Structural Rules for Bulk Carriers~~ *IACS Common Structural Rules for Bulk Carriers and Oil Tankers (CSR)* respectively, the renewal criteria of the local structure for general corrosion is to be calculated in accordance with the applicable ~~Common Structural Rules~~ *CSR* renewal criteria.

Corrigenda

■ Section 10

Hull strengthening requirements for navigation in multi-year ice conditions – Ice Classes PC1, PC2, PC3, PC4, PC5, PC6, PC7 and Icebreaker

10.8 Hull area factors

(Part only shown)

Table 2.10.4 Hull area factors (AF) for icebreaker

	B _i /B	B _i /i	B _i /l	B _i /b	M _i	M _l	M _b	S _i	S _l	S _b
PC1	1	0,90	0,70	0,55	0,70	0,50	0,30	0,94	0,56	0,35

10.10 Framing – General

10.10.9 When the cross-sectional area of the local frame exceeds the cross-sectional area of the attached plate flange, the plastic neutral axis is located a distance z_{na} above the attached shell plate, given by:

$$z_{na} = \frac{100A_{fn} + h_w t_{wn} - 1000t_{pn}s}{2t_{wn}} \text{ mm}$$

and the net effective plastic section modulus, Z_p , is given by:

$$Z_p = t_{pn}s \left(\frac{t_{pn}}{2} \right) \sin \varphi_w + \left(\frac{\left((h_w - z_{na})^2 + z_{na}^2 \right) t_{wn} \sin \varphi_w}{2000} + \frac{A_{fn} (h_{fc} - z_{na}) \sin \varphi_w - b_w \cos \varphi_w}{10} \right) \text{ cm}^3$$

$$Z_p = t_{pn}s \left(z_{na} + \frac{t_{pn}}{2} \right) \sin \varphi_w + \left(\frac{\left((h_w - z_{na})^2 + z_{na}^2 \right) t_{wn} \sin \varphi_w}{2000} + \frac{A_{fn} (h_{fc} - z_{na}) \sin \varphi_w - b_w \cos \varphi_w}{10} \right) \text{ cm}^3$$

10.10.10 In the case of oblique framing arrangement ($70^\circ > \Omega > 20^\circ$, where Ω is defined as given in 40.9.2 *Table 2.10.5*), linear interpolation is to be used.

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